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## Ecological and environmental policies versus a steady state economy in times of crisis

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**Artists as the New Naturalists: a Response and Expansion to Jacobson et al.**

Jacobson et al. (2007) provide a wonderful service in bringing attention to the important role artists and the arts play in the multidisciplinary practice of conservation biology. However, their emphasis on the arts as a tool to advance public awareness and appreciation of nature is too limited. I suggest that the arts could fulfill a far greater collaborative partnership with field science once scientists open themselves to the possibilities. The arts can bring people to the sciences, and artists can serve as the impetus and origination of critical scientific thinking.

It is odd to me when scientists dismiss the work of artists as irrelevant to their own, acknowledging perhaps that art certainly helps promote our appreciation of nature, but contributes nothing to scientific process. This is a major mistake. Artists who are inspired by nature and natural processes are working principally from arbitrary, but careful, observations of the natural world. They are our new naturalists, and we would be wise to pay closer attention to the results they are generating. They are practicing natural history in much the same way that artists have for millennia: as excellent observers and recorders of Earth's qualities. The work of ancient Chinese poets, European landscape painters, and contemporary artists and writers, such as Peter Matthiessen, Gary Snyder, Diane Ackerman, or Andrew Goldsworthy, fall gracefully in this tradition (Snyder 2007). What any good field biologist knows is that observational data, whether statistically valid or not, can lead to interesting ideas. It can form the foundation and premise

on which rigorous scientific thinking emerges.

A clear example of this pattern is obvious in the art of David Dunn, a contemporary sound artist whose work is inspired by natural processes as diverse as the underwater calls of aquatic invertebrates and the communication processes of forest elephants. In recent years Dunn has devoted his attention to interpreting the role of sound in the behavior of invasive engraver bark beetles (*Ips confuses*) in southwestern conifer forests (Dunn & Crutchfield 2006). Without specifically applying rigorous scientific principles in his fieldwork, Dunn has nonetheless produced intriguing insights into some of the less understood factors driving bark beetles as they continue to ravage pinyon pine (*Pinus edulis*) woodlands and move voraciously into higher-elevation forests.

Dunn uses custom-built vibration transducers assembled inexpensively from scavenged greeting cards and discarded appliances to construct listening devices that he inserts between the outer bark and interior phloem, where bark beetles attack and colonize. In most cases the sounds produced by the beetles are not audible to the human ear or conventional air microphones. His meticulous and patient observations and recordings of engraver beetle behavior has produced important insights into factors that could very well be significant causative and potentially controlling factors in the life cycle of this invasive and highly destructive organism.

Dunn is an artist and makes no bones about it (Dunn 2001). The first of beetle recordings, *The Sound of Light in Trees*, may not be sitting on top of the pop charts, but it is interesting, particularly to biologists. His

work is already yielding valuable insights for forest entomologists trying to understand and control the impacts from the *Ips confuses* invasions, and at least one entomologist is interested in building from Dunn's work to construct statistically validated field assessments.

The work of artists is essential to our work in public awareness and environmental education. The biodiversity exhibit at the Museum of Natural History in New York is a great example of how art leads us back to science and of how the two can get so intertwined that they cannot be easily separated. Artists can bring attention to the plight of our natural world more quickly and with greater profundity for a lay audience than most scientific announcements. We need galleries devoted entirely to photography, paintings, and other fine arts that are focused on interpreting and evaluating human relationships with nature. We need conservation biologists as action heroes in films.

But I think we should take the art and conservation relationship a little further. Some of the artists among us may be showing us where conservation science needs to go. And, many more artists may be inspired to do so if we invite them on our journey. Artists taking risks and being good observational naturalists can give direction to rigorous field science. They can also help interpret and provide meaning for the results of science, which then makes this an interesting team effort. Conservation biology, as an integrative and collaborative science, is in an excellent position to enact this change. Invite an artist on your next field trip to a coastal wetland or on a forest inventory. Better yet, put one on your project team. You might be intrigued by the results.

**James Tolisano**

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## **Ecological and Environmental Policies versus a Steady State Economy in Times of Crisis**

In his editorial “If Rome Is Burning, Why Are We Fiddling?” Brian Czech (2006) observes that the world can seem like a vast tragedy unfolding, and he speaks of the “sixth great extinction crisis.” Although we agree with his diagnosis, we have problems in accepting the major premise of his therapy: adopt the “steady state economy.” Practically, would a steady state economy have a chance of getting accepted anywhere? More important, would it work or would it make the situation worse? In consideration of an answer to these questions, consider Czech’s obese person. Would any doctor advise this person to adopt the steady state (i.e., to continue eating the same quantities and types of food)? Most likely not. A good doctor’s advice would be to

substantially change the diet (i.e., to decrease the intake of fat and calories and to increase the consumption of fruit and vegetables).

A similar therapy applies to the economy and its negative environmental and ecological impacts (EELs). As Czech points out, economic growth is the increase in the production and consumption of goods and services. Nevertheless, as in the case of health and food, the goods and services that make up the gross domestic product (GDP) do not all have the same types of EELs. Some are more damaging than others. The GDP is not only composed of polluting and ecologically damaging goods and services, such as cars and roads, but also includes health care, hiking, education, and economic and ecological research with much less negative EELs. Hence, it is not overall economic growth that should be restricted but rather the production and consumption of goods and services with detrimental EELs. In other words, it is selective growth and decline rather than steady state that is needed.

Nevertheless, there are some important caveats. As Czech correctly observes, population growth leads to more production and consumption of polluting goods. So, controlling population growth is a major prerequisite for controlling environmental and ecological degradation. Economic growth, however, (including growth of the output of food and shelter and of other goods and services needed for the fulfillment of basic needs whose production goes together with negative EELs) is a prerequisite for controlling population growth (e.g., Heerink & Folmer 1994). Hence, Czech’s suggestion of a worldwide steady state in terms of goods with substantial negative EELs would undermine the control of population growth. Particularly, restrictions on economic growth in developing countries with high population growth would be counterproductive. Moreover, there is ample evidence that the awareness of and will-

ingness to pay to forego environmental and ecological degradation and to invest in nature conservation, environmentally benign R&D, and cleaner technology, requires per capita income levels of at least several thousands of U.S. dollars (e.g., Cole et al. 1997; Komen et al. 1997 and references therein). Again, for countries that have not yet reached the turning point, further growth is needed. This, in turn, implies production growth of goods and services with negative EELs.

If Czech’s therapy of a steady state economy will not work, what other policy instruments to achieve environmental and ecological protection should be adopted? To answer this question, a distinction must be made between developed and developing countries. Let us first discuss the former. Czech observes that in the macroeconomic policy arena, fiscal, monetary, and trade policies have been developed with great impacts on biodiversity. Nevertheless, he ignores the development of a vast array of environmental policies, particularly regulations and standards, such as bans on the exploitation of ecologically important areas, the use of pesticides and fertilizers, and economic instruments, notably taxes and charges, tradable emission permits, damage liability, and compensation and voluntary approaches. There is ample evidence that these approaches have worked well in many developed countries (e.g., Folmer & Gabel 2000).

Again, for developing countries, restrictions on (further) increases in per capita gross domestic product (GDP) are unacceptable and counterproductive. Nevertheless, the detrimental EELs can be mitigated by means of income and technology transfers from developed to developing countries. These transfers should be accompanied by partnerships with developed countries and international organizations that help improve the development, implementation, and enforcement of environmental and ecological protection and

stimulate the awareness of the advantages of adopting sustainable development. Individual ecologists and their organizations can play important roles in this context, for instance, by shedding light on the importance of environmental and ecological assets for tourism, development of new medicines, and the many immediate and long-term values of living in environments with good environmental and ecological conditions.

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Folmer and Piersma (2007) agree with me and, I dare say, conservation biologists at large on two key points: biodiversity is in steep decline, and production and consumption of goods and services have negative environmental and ecological impacts, including biodiversity loss. Our differences lie in how we respond to these points.

Many of us (myself included) believe the steady state economy is an appropriate response because biodiversity loss results from increasing production and consumption of goods and services (i.e., economic growth). Folmer and Piersma argue that a steady state economy would be neither politically acceptable nor have the desired effect. Their argument is based on a misunderstanding of what a steady state economy is and to that extent is invalid.

Folmer and Piersma ask, “Would any doctor advise this [obese] person to adopt the steady state (i.e., to continue eating the same quantities and types of food)?” “Eating the same quantities and types of food”, however, would not qualify one for a steady state. Because I provided the metaphor to begin with, I can clarify that the real criterion is the patient’s weight, which would stabilize in a steady state. If the obese person is gaining weight, then the steady state will likely require a *decreased* intake, especially of “fat and calories,” which according to Folmer and Piersma is indeed what the “good doctor” would advise.

Furthermore and ideally, the healthy individual would grow through childhood and achieve an *optimal* steady state as an adult. Nevertheless, steady states may exist at lower or higher weights. In the case of the obese, the good doctor would first prescribe weight loss, followed by a steady state. Thus we have in France, for example, the movement for “La Décroissance,” promulgated by those who think the French economy is not only ripe for a steady state but overripe and firstly in need of “The Decrease.”

Moving beyond metaphor, Folmer and Piersma agree that “the GDP is composed of polluting and ecologically damaging goods and services such as cars and roads, but also includes health care, hiking, education, and economic and ecological research with much less negative EELs” (environmental and ecological impacts). In other words,

*all* production and consumption has negative ecological impacts, including biodiversity loss. Inexplicably, Folmer and Piersma conclude, “Hence, it is not overall economic growth that should be restricted but rather the production and consumption of goods and services with detrimental EELs.” Some might call this approach “smart growth”; perhaps “not-as-dumb growth” would be more accurate. The obese person needs to stop gaining weight, especially from bacon but even from beans.

Folmer and Piersma seem unfamiliar with my work and that of SCB’s Working Group for Ecological Economics and Sustainability Science (WGEESS). They refer to “Czech’s suggestion of a worldwide steady state” and note that “restrictions on economic growth in developing countries with high population growth would be counterproductive.” Going back to my earliest work on this subject, I have always acknowledged that many if not most developing countries need economic growth before they can embrace the merits of a steady state economy (e.g., Czech 2000, 2001). This is a matter of common sense and a nugget of truth in the “environmental Kuznets curve,” which otherwise is macroeconomically fallacious (Czech et al. 2004) and, unsurprisingly, has not been detected for biodiversity (Naidoo & Adamowicz 2001) nor, for that matter, for any but a few microeconomic scenarios, such as certain pollutants from certain sectors (Stern 2004).

In the WGEESS, with an executive board representing all continents and several developing countries, we have proposed a position on economic growth for the SCB that states (among other things), “economic growth remains an appropriate goal in societies where the material standard of living is inadequate for healthy and happy lives . . . economic growth is no longer an appropriate goal in wealthier parts of the world, where instances of poverty

may be eliminated through the sharing of wealth rather than an attempt to amass more per capita wealth simply by growing the economy in the aggregate."

Next, noting my focus on macro-economic policy reform for biodiversity conservation, Folmer and Piersma say I ignore "the development of a vast array of environmental policies" and that "[t]here is ample evidence that these approaches have worked well in many developed countries." There is ample evidence that they *haven't* worked well, too, and I have reported on a primary reason. Prior to "ignoring" environmental policies, I conducted a policy analysis of the U.S. Endangered Species Act (ESA) for my Ph.D. dissertation. It is worth reflecting on the first sentence of the ESA, in which Congress "finds and declares" that species "have been rendered extinct as a consequence of economic growth and development." The list of threatened and endangered species has burgeoned since then, not for a lack of environmental policies but because economic growth has remained the overriding domestic

policy goal (Czech & Krausman 2001).

There are two types of flaws in Folmer and Piersma's argument. One type is logical; for example, they advocate economic growth yet acknowledge the ecological impacts (including biodiversity loss) of increasing production and consumption of goods and services. This logical inconsistency could be overcome by acknowledging that economic growth is needed in developing countries, but has surpassed the optimum in developed countries, much as the WGEES posits.

The second flaw is a misrepresentation of my work, as noted in the latter paragraphs of this response. Folmer and Piersma are responding to "If Rome is Burning," and apparently not to a collection of work, so perhaps "misrepresentation" is too strong a charge. I encourage Folmer and Piersma and other interested parties to investigate the body of literature on economic growth and biodiversity conservation prior to weighing in on the technical aspects or formulating opinions about policy advocacy.

## Brian Czech

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